CRUDE-OIL AND REFINED PRODUCTS PIPE-LINE MILEAGE IN THE UNITED STATES, JANUARY 1, 1950

BY A. T. COUMBE AND I. F. AVERY

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by A. T. Coumbe[1] and I. F. Avery[1]

The Bureau of Mines has completed a survey of petroleum pipe-lines by direct correspondence with the oil companies and the use of the records of the Interstate Commerce Commission in order to cover both interstate and intrastate systems. The review shows that crude petroleum and product pipe-lines in the United States had a total length of 152,814 miles on January 1, 1950, an increase of 25,463 miles since May 1, 1941, the time of the last previous survey. The expansion in pipe-line systems was due largely to new trunk-line construction, as the mileage built to carry refined products increased by 11,880 miles, and those intended for crude-oil transportation gained 6,193 miles. Trunk lines represented 60 percent of all pipe-line mileage on January 1, 1950, compared with 58 percent in 1941.

The average diameter of trunk-lines for crude oil, as calculated on the various sizes and weighted according to their respective lengths, increased to 9.8 inches on January 1, 1950, compared with 8.4 inches on May 1, 1941. The mileage for lines up to 8 inches used in crude trunk-lines has decreased since the 1941 survey, while those of larger sizes have increased.

The extensive use of large-diameter oil pipe-lines has developed since the construction of two major lines from Texas to the East Coast at government expense as a World War II emergency measure. The successful operation of these lines proved their economic advantages over smaller-diameter lines as well as their effectiveness in moving unprecedented volumes of oil during the period when tanker movements were restricted by submarine action in the Atlantic Ocean. The 24-inch diameter "Big Inch" line carries over 300,000 barrels daily of crude oil, and the 20-inch "Little Big Inch" carried over 230,000 barrels daily of gasoline and light fuel oils to destinations where they were urgently needed.

Although these lines were sold and converted to natural-gas service in December 1946, after fulfilling their wartime mission, their record proved to the industry that significantly lower operating and investment costs per barrel-mile of oil moved could be achieved than were possible with the comparatively small lines in general use up to that time. Hence, the several major oil pipe-line projects that have been constructed since the late war are of large diameter pipe. To assure supplies and market outlets of sufficient magnitude to support such lines and provide adequate flexibility, ownership is often shared by several large companies whose transport needs are served in common. The principal recent expansion in facilities has been from supply points in Southwestern States toward markets in the North and East and to Gulf tidewater.

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Original from THE OHIO STATE UNIVERSITY

Salient statistics of pipe-line mileage in the United States

State	Trunk lines (including product lines)					Gathering lines					Total miles				
	1926	1931	1936	1941	1949	1926	1931	1936	1941	1949	1926	1931	1936	1941	1949
Alabama	-	-	-	-	284	-	-	-	-	-	-	-	-	-	284
Arkansas	830	820	650	580	1,063	940	840	650	600	718	1,770	1,660	1,300	1,180	1,781
California	3,210	3,780	2,680	3,590	4,272	1,800	1,820	1,770	2,220	1,976	5,010	5,600	4,450	5,810	6,248
Colorado	8	20	20	115	584	60	90	100	90	133	68	110	120	205	717
Connecticut	-	-	-	22	22	-	-	-	-	-	-	-	-	22	22
Florida	-	-	-	78	78	-	-	-	-	-	-	-	-	78	78
Georgia	-	-	-	380	815	-	-	-	-	-	-	-	-	380	815
Illinois	1,800	3,020	3,110	5,087	6,248	1,170	1,140	940	1,850	3,201	2,970	4,160	4,050	6,937	9,449
Indiana	1,540	1,980	1,980	2,712	3,268	450	410	280	280	389	1,990	2,390	2,260	2,992	3,657
Iowa	77	98	100	1,014	1,327	-	-	-	-	-	77	98	100	1,014	1,327
Kansas	2,430	3,440	3,770	6,085	6,110	3,220	3,500	3,910	4,040	6,265	5,650	6,940	7,680	10,125	12,375
Kentucky	570	540	430	500	217	1,660	1,700	1,340	1,310	786	2,230	2,240	1,770	1,810	1,003
Louisiana	1,890	1,890	2,200	2,015	3,003	720	900	1,100	1,320	1,627	2,610	2,790	3,300	3,335	4,630
Maine	-	-	-	-	200	-	-	-	-	-	-	-	-	-	200
Maryland & D. C.	33	33	-	-	77	-	-	-	-	-	33	33	-	-	77
Massachusetts	-	-	-	153	177	-	-	-	-	-	-	-	-	153	177
Michigan	138	325	490	940	1,057	-	160	250	430	715	138	485	740	1,370	1,772
Minnesota	--	-	-	248	974	-	-	-	-	-	-	-	-	248	974
Mississippi	-	-	-	-	438	-	-	-	20	393		-	-	20	831
Missouri	2,490	4,170	4,180	5,183	6,063	-	-	-	-	-	2,490	4,170	4,180	5,183	6,063
Montana	130	60	100	140	319	20	215	350	350	523	150	275	450	490	842
Nebraska	404	404	390	583	1,050	-	-	-	10	24	404	404	390	593	1,074
New Hampshire	-	-	-	-	38	-	-	-	-	-	-	-	-	-	38
New Jersey	480	190	180	259	328	-	-	-	-	-	480	190	180	259	328
New Mexico	70	150	300	450	594	20	350	450	900	1,618	90	500	750	1,350	2,212
New York	1,200	210	200	817	766	710	610	550	600	480	1,910	820	750	1,417	1,246
North Carolina	-	-	-	-	111	-	-	-	-	-	-	-	-	-	111
North Dakota	-	-	-	-	81	-	-	-	-	-	-	-	-	-	81
Ohio	2,690	2,580	2,360	3,109	4,307	6,320	5,780	5,620	4,940	3,299	9,010	8,360	7,980	8,049	7,606
Oklahoma	8,220	10,990	10,170	9,646	9,584	10,960	13,510	11,510	10,280	9,245	19,180	24,500	21,680	19,926	18,829
Pennsylvania	5,260	3,510	3,470	5,119	6,082	6,340	6,540	5,810	5,690	4,796	11,600	10,050	9,280	10,809	10,878
Rhode Island	-	-	-	17	13	-	-	-	-	-	-	-	-	17	13
South Carolina	-	-	-	-	102	-	—	-	-	-	-	-	-	-	102
South Dakota	-	-	-	24,	182	-	-	-	-	-	-	-	-	24	182
Tennessee	-	-	-	-	109	30	15	10	-	-	30	15	10	-	109
Texas	9,470	18,880	20,290	23,465	29,034	6,060	10,460	12,600	13,420	20,149	15,530	29,340	32,890	36,885	49,183
Utah	-	-	-	80	287	-	-	-	-	-	-	-	-	80	287
Vermont	-	-	-	-	59	-	-	-	-	-	-	-	-	-	59
West Virginia	400	320	260	330	587	5,000	4,910	4,820	4,480	3,660	5,400	5,230	5,080	4,810	4,247
Wyoming	1,130	610	490	1,440	2,344	220	690	700	340	563	1,350	1,300	1,190	1,780	2,907
Total	44,470	1/58,020	2/57,820	74,181	92,254	45,700	53,640	52,760	53,170	60,560	90,170	1/111,660	2/110,580	127,351	152,814

1/ Excludes 1,400 miles of gasoline pipe-line, breakdown by States not available.

2/ Excludes 4,600 miles of gasoline pipe-line, breakdown by States not available.

Mileage of crude-oil and natural-gasoline gathering lines,
by size of pipe, as of January 1, 1950
(odd sizes are included in next smaller size)

State	Inches							
	2	3	4	6 1/	8 2/	10	over 10	Total
Arkansas	159	50	355	111	41	2		718
California	29	158	511	878	337	56	7	1,976
Colorado	2		63	50	8	2	8	133
Illinois	545	805	1,426	255	125	43	2	3,201
Indiana	110	191	69	17	1	1		389
Kansas	945	1,409	2,510	721	571	92	17	6,265
Kentucky	550	170	26	39	1			786
Louisiana	262	88	695	394	181	2	5	1,627
Michigan	38	232	289	141	15			715
Mississippi	67	23	210	52	24	3	14	393
Montana	116	227	126	40	12	1	1	523
Nebraska		3	21					24
New Mexico	104	135	1,056	246	64	13		1,618
New York	338	112	26	4				480
Ohio	1,821	735	554	188	1			3,299
Oklahoma	2,447	1,574	2,863	1,802	523	32	4	9,245
Pennsylvania	3,489	935	283	88	1			4,796
Texas	3,912	2,097	9,327	3,650	1,017	120	26	20,149
West Virginia	2,309	629	347	364	10	1		3,660
Wyoming	6	82	183	184	98	8	2	563
Total January 1, 1950	17,249	9,655	20,940	9,224	3,030	376	86	60,560
Total May 1941 3/								53,170

1/ Includes a small mileage of 5 inch pipe-line.
2/ Includes a small mileage of 7 inch pipe-line.

Gathering lines in the past 9 years have increased by 14 percent, or from 53,170 miles reported in 1941 to 60,560 miles as of January 1, 1950. The greatest gain is reported for Texas, where the mileage of gathering lines increased by 6,729 miles, whereas changes in other States have been relatively unimportant. Gathering lines were not reported by sizes in the 1941 survey; however, the trend towards greater use of 4- and 6-inch sizes in gathering lines was evident even before 1936, according to earlier surveys. In 1936, gathering lines 4 inches and larger made up 45 percent of the total, compared with 56 percent on January 1, 1950.

Mileage of crude-oil trunk-lines, by size of pipe, as of January 1, 1950
(odd sizes are included in next smaller size)

States	Inches							
	Under 4	4	6 1/	8 2/	10	12	Over 12	Total
Arkansas	32	78	201	194	8		296	809
California	4	62	449	1,742	573	244	185	3,259
Colorado	14	1	56	7	338	1		417
Illinois	15	195	328	1,664	1,054	1,047	581	4,884
Indiana	10	33	343	1,139	686	322	24	2,557
Iowa				20	2	65	17	104
Kansas	125	206	786	1,365	612	681	243	4,018
Kentucky	80	97	34					211
Louisiana	13	196	561	986	226	461	16	2,459
Maine						73	3	76
Michigan	5	126	395	400	1	1		928
Mississippi	3	22	36	96	102	13		272
Missouri	3	2	12	1,399	1,714	1,343	691	5,164
Montana	43	42	152	16		66		319
Nebraska	1	4	1	1	51	248	137	443
New Hampshire						38		38
New Jersey			126	50		1		177
New Mexico		93	73	260	51	10	107	594
New York	27	40	81	81	1			230
Ohio	23	21	678	1,836	256	280	83	3,177
Oklahoma	207	536	1,401	3,448	1,187	694	974	8,447
Pennsylvania	440	207	2,072	569	5	4		3,297
Texas	117	659	3,601	11,345	6,320	2,968	1,399	26,409
Utah			26	79	182			287
Vermont						59		59
West Virginia	70		481	25	3	1		580
Wyoming	1	148	361	1,058	128	407	55	2,158
Total January 1, 1950	1,233	2,768	12,254	27,780	13,500	9,027	4,811	71,373
Total May 1941	1,050	3,590	12,570	29,380	11,710	6,710	170	65,180

1/ Includes a small mileage of 5 inch pipe-line.
2/ Includes a small mileage of 7 inch pipe-line.

Crude-oil trunk lines increased by 6,193 miles in the 1941-1949 period. Pipe-lines 10 inches and over were greater by 8,748 miles, whereas the smaller sizes decreased by 2,555 miles in this interval. The larger trunk lines of 12 inches and over gained 6,958 miles, showing the greatest expansion for sizes over 12 inches, which gained 4,641 miles. These larger pipe sizes averaged about 20 inches in diameter.

Crude-oil trunk lines increased in most States. Texas, with 3,539 miles of new lines since 1941, continues to lead other States by a substantial margin. Important expansion also took place in Illinois, Louisiana, Missouri, Ohio and Wyoming. Reductions in crude trunk-line mileage were reported for California, Kansas, Kentucky, New York, Oklahoma, and Pennsylvania. Kansas showed the greatest lose in mileage - 918 miles.

Mileage of refined-products trunk lines, by size of pipe, as of January 1, 1950
(odd sizes are included in next smaller size)

State	Inches							
	Under 4	4	6[1]	8	10	12	Over 12	Total
Alabama	-	72	-	12	-	200	-	284
Arkansas	12	37	-	55	150	-	-	254
California	150	229	384	206	23	21		1,013
Colorado	-	-	84	83	-	-	-	167
Connecticut	-	-	22	-	-	-	-	22
Florida	-	-	-	78	-	-	-	78
Georgia	-	167	146	343	147	12	-	815
Illinois	1	1	289	888	173	12	-	1,364
Indiana	1	1	30	665	4	9	1	711
Iowa	6	2	823	271	121			1,223
Kansas	-	151	675	1,265	-	1	-	2,092
Kentucky	-	-	6	-	-	-	-	6
Louisiana	-	21	81	189	174	79	-	544
Maine	-	-	124	-	-	-	-	124
Maryland (and D. C.)	-	-	77	-	-	-	-	77
Massachusetts	-	-	177	-	-	-	-	177
Michigan	-	-	129	-	-	-	-	129
Minnesota	-	-	443	405	126	-	-	974
Mississippi	-	-	-	-	-	166	-	166
Missouri	-	-	13	886	-	-	-	899
Nebraska	-	-	153	454	-	-	-	607
New Jersey	-	-	-	150	-	1	-	151
New York	1	17	262	256	-	-	-	536
North Carolina	-	-	-	3	108	-	-	111
North Dakota	-	-	81	-	-	-	-	81
Ohio	8	46	749	326	-	1	-	1,130
Oklahoma	-	183	286	667	-	1	-	1,137
Pennsylvania	73	88	1,097	1,347	64	116	-	2,785
Rhode Island	-	-	-	13	-	-	-	13
South Carolina	-	-	-	-	102	-	-	102
South Dakota	-	-	130	52	-	-	-	182
Tennessee	-	-	5	104	-	-	-	109
Texas	139	351	415	1,083	436	198	3	2,625
West Virginia	-	-	7	-	-	-	-	7
Wyoming	-	-	8	178	-	-	-	186
Total, Jan. 1, 1950	391	1,366	6,696	9,979	1,628	817	4	20,881
Total, May 1941	162	692	3,781	4,230	68	68		9,001

[1] Includes a small mileage of 5-inch pipe line.

The mileage of refined-products trunk lines increased by 11,880 miles. They have more than doubled since 1941, as the oil companies have come to recognize the efficiency and lower comparative cost of this method of distribution. Product lines are operated in 35 States and the District of Columbia at the present time, and a new one is being extended to the States of the Pacific Northwest. Pennsylvania, with 2,785 miles of product lines, continues to lead other States in mileage; however, Texas showed the greatest gain, as over 2,000 miles of new product lines have been put in operation there since 1941.

Mileage of crude-oil and refined-products pipe lines in the United States, by sizes, June 30, 1936, May 1, 1941, and Jan. 1, 1950.

Size (I.D.)1/	Trunk lines					Gathering lines		
	Crude oil			Products				
	1936	1941	1949	1941	1949	1936	1941	1949
2-inch.........	-	-	-	-	-	19,620		17,249
3-inch.........	-	-	-	-	-	9,220		9,655
Below 4-inch...	1,270	1,050	1,233	162	391	-		-
4-inch.........	3,990	3,590	2,768	692	1,366	13,550	Not available	20,940
6-inch.........	10,460	12,570	2/12,254	3,781	6,696	7,680		9,224
Above 6-inch...	-	-	-	-	-	2,690		3,492
8-inch.........	27,060	29,380	27,780	4,230	9,979	-		-
10-inch........	9,450	11,710	13,500	68	1,628	-		-
12-inch........	5,510	6,710	9,027	68	817	-		-
Above 12-inch..	80	170	4,811	-	4	-		-
Total U.S....	57,820	65,180	71,373	9,001	20,881	52,760	53,170	60,560

1/ Data for odd sizes are included in next smaller size listed.
2/ Includes a small mileage of 5-inch pipe.

The calculated volumetric capacity of crude lines in 1936 was 24,540,000 barrels, and this had increased to 40,779,000 barrels by the end of 1949. These theoretical cubic capacities, shown separately by trunk and gathering lines and by States, are included in the following table. The gatherine-line fill is not available in the 1941 survey, as data on line sizes were lacking.

Cubic capacity (pipe-line fill) for gathering line and trunk lines, by States, thousands of barrels

State	Gathering lines			Crude-oil trunk lines			Refined products, Jan. 1, 1950
	June 30 1936	May 1 1941	Jan. 1 1950	June 30 1936	May 1 1941	Jan.1 1950	
Alabama	-	-	-	-	-	-	158
Arkansas.........	66	Not available	70	202	184	720	98
California.......	311		356	1,018	1,280	1,442	188
Colorado.........	7		24	3	18	187	43
Connecticut......	-	-	-	-	-	-	4
Florida..........	-	-	-	-	-	-	26
Georgia..........	-	-	-	-	-	-	238
Illinois.........	58	-	227	1,353	1,910	3,129	443
Indiana..........	26	-	21	738	1,025	1,079	234
Iowa.............	-	-	-	55	55	90	303
Kansas...........	375	-	671	1,229	1,662	1,931	553
Kentucky.........	49	-	29	47	56	18	1
Louisiana........	116	-	203	734	713	933	226
Maine............	-	-	-	-	-	54	23
Maryland.........	-	-	-	-	-	-	14
Massachusetts....	-	-	-	-	-	-	33
Michigan.........	16	-	66	116	189	216	24
Minnesota........	-	-	-	-	-	-	279
Mississippi......	-	-	49	-	-	102	123
Missouri.........	-	-	-	1,948	2,302	4,048	293
Montana..........	-	-	36	15	15	88	-
Nebraska.........	28	-	2	255	253	438	177
New Hampshire....	-	-	-	-	-	28	-
New Jersey.......	-	-	-	39	28	40	50
New Mexico.......	48	-	168	80	150	318	-
New York.........	18	-	15	22	45	44	134
North Carolina...	-	-	-	-	-	-	56
North Dakota.....	-	-	-	-	-	-	15
Ohio.............	266	-	152	694	870	1,275	250
Oklahoma.........	1,020	-	882	2,847	2,804	4,564	291
Pennsylvania.....	186	-	154	649	625	612	772
Rhode Island.....	-	-	-	-	-	-	4
South Carolina...	-	-	-	-	-	-	52
South Dakota.....	-	-	-	-	-	-	41
Tennessee........	-	-	-	-	-	-	35
Texas............	1,318	-	2,031	7,972	8,762	12,773	840
Utah.............	-	-	-	-	22	124	-
Vermont..........	-	-	-	-	-	44	-
West Virginia....	275	-	176	53	54	103	1
Wyoming..........	139	-	91	149	426	905	62
Total.......	4,332	-	5,473	20,218	23,448	35,306	6,084

Comparison of mileage of gathering lines, by size of pipe, 1936 and 1949

State	2-inch		3-inch		4-inch	
	1936	1949	1936	1949	1936	1949
Arkansas	116	159	25	50	372	355
California	60	29	75	158	557	511
Colorado	26	2	21	-	47	63
Illinois	389	545	303	805	92	1,426
Indiana	91	110	75	191	10	69
Kansas	1,303	945	895	1,409	839	2,510
Kentucky	929	550	235	170	126	26
Louisiana	173	262	24	88	578	695
Michigan	51	38	114	232	56	289
Mississippi	-	67	-	23	-	210
Montana	52	116	96	227	139	126
Nebraska	-	-	-	3	-	21
New Mexico	55	104	38	135	264	1,056
New York	391	338	109	112	36	26
Ohio	3,157	1,821	1,281	735	850	554
Oklahoma	3,332	2,447	2,475	1,574	3,100	2,863
Pennsylvania	4,098	3,489	1,353	935	251	283
Texas	2,548	3,912	1,312	2,097	5,547	9,327
West Virginia	2,823	2,309	775	629	435	347
Wyoming	16	6	14	82	251	183
Total	1/19,620	17,249	9,220	9,655	13,550	20,940
Percent change		-12.1		+4.7		+54.5
Percent of total	37.2	28.5	17.5	15.9	25.7	34.6

State	6-inch		Over 6-inch		Total		Percent change
	1936	1949	1936	1949	1936	1949	1936-1949
Arkansas	96	111	41	43	650	718	+10.5
California	704	878	374	400	1,770	1,976	+11.6
Colorado	3	50	3	18	100	133	+33.0
Illinois	156	255	-	170	940	3,201	+240.5
Indiana	102	17	2	2	280	389	+38.9
Kansas	405	721	468	680	3,910	6,265	+60.2
Kentucky	50	39	-	1	1,340	786	-41.3
Louisiana	297	394	28	188	1,100	1,627	+47.9
Michigan	29	141	-	15	250	715	+186.0
Mississippi	-	52	-	41	-	393	-
Montana	63	40	-	14	350	523	+49.4
Nebraska	-	-	-	-	-	24	-
New Mexico	62	246	31	77	450	1,618	+259.6
New York	14	4	-	-	550	480	-12.7
Ohio	310	188	22	1	5,620	3,299	-41.3
Oklahoma	1,816	1,802	787	559	11,510	9,245	-19.7
Pennsylvania	106	88	2	1	5,810	4,796	-17.5
Texas	2,484	3,650	709	1,163	12,600	20,149	+59.9
West Virginia	773	364	14	11	4,820	3,660	-24.1
Wyoming	210	184	209	108	700	563	-19.6
Total	7,680	9,224	2,690	3,492	1/52,760	60,560	
Percent change		+20.1		+29.8		+14.8	
Percent of total	14.5	15.2	5.1	5.8	100.0	100.0	

1/ Includes 10 miles of pipe in Tennessee.

Interior - Bureau of Mines, Pittsburgh, Pa.